

**REMARKS**

This is a full and complete response to the Office action dated December 28, 2006.

All comments and remarks of record are herein incorporated by reference. Applicants respectfully traverse these rejections and all comments made in the Office action. Nevertheless, in an effort to expedite prosecution, Applicants provide the following remarks regarding the cited references.

**DISPOSITION OF CLAIMS**

Claims 11-32 are pending in the present application. Claim 33 has been added, with support found in the application on page 5, line 12 to page 6, line 12. No new matter has been added.

**REJECTION UNDER 35 USC §103 OVER WINKLER**

Claims 11-16 and 23-26 stand rejected under 35 USC §103(a) as being unpatentable over **Winkler**, US 3,700,748. Applicants respectfully traverse this rejection.

Applicants respectfully assert that Applicants are not challenging the enablement of **Winkler**'s claims. However, Applicants respectfully assert that **Winkler** does not disclose or suggest Fe as the preferred component of a catalyst. Furthermore, **Winkler** does not disclose or suggest the selectivity of the present claims. Moreover, Applicants respectfully assert that **Winkler** does not disclose or suggest the ratio of Lithium alkoxide as in claims 14 and 33. The following remarks demonstrate in greater detail that the present claims are in allowable condition.

According to 35 USC §103, the proper focus of an obviousness inquiry is whether the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the claimed invention was made. *See* 35 USC §103 (emphasis added). Furthermore, the question under 35 USC §103 is not merely what a reference teaches, but would it would have

reasonably suggested to one of ordinary skill in the art at the time the invention was made. *See Merck & Co., Inc. v. Biocraft Laboratories, Inc.*, 874 F.2d 804, 10 USPQ2d 1843 (Fed Cir. 1989).

Applicants respectfully assert that **Winkler** does not disclose or suggest the presently claimed invention especially in view of the experimental results as illustrated in the present application.

According to the **Winkler** reference, the catalysts disclosed therein predominantly hydrogenate all the pendant vinyl groups and not more than about 50% of the unsaturation in the 1,4-structured portions of the block. *See Winkler* col. 2, lines 38-42. However, Applicants respectfully assert that **Winkler** does not show selectivity as presently claimed.

The present claims recite a method of hydrogenating a polymer having a vinyl content of from 20 to 65%, and a 1,4-double bond content of from 35 to 80% such that the vinyl content is reduced to 5% or less and the content of the 1,4-double bonds are maintained at a level of at least 30%.

Applicants respectfully assert that as **Winkler** merely discloses that not more than 50% of the 1,4-double bonds are hydrogenated, that for any polymer having a 1,4-double bond content of 60% prior to hydrogenation, the 1,4-double bond level after hydrogenation would be less than 30%. Therefore, Applicants respectfully assert that **Winkler** does not disclose or suggest the selectivity according to the instant claims.

Furthermore, although the **Winkler** patent provides an example with partial hydrogenation, the selectivity according to the instant claims has not been shown. Example 1 of **Winkler** merely discloses that there was 75% conversion of the total amount of initial unsaturated olefinic carbon-carbon bonds. *See Application*, page 3, lines 2-6. The 1,4-double bond content prior to hydrogenation was not shown, and neither was the vinyl content nor the 1,4-double bond content after hydrogenation shown. *See Winkler*, example 1. Therefore, no selectivity is disclosed or suggested by the **Winkler** reference.

Moreover, the examples of the present application demonstrate that selectivity of the instant claims is not attained by the method of **Winkler**. In repeating the example

disclosed in **Winkler** with a polymer having a vinyl content of 45% and using a nickel octanoate of 1 ppm level, it was found that at 75% conversion of the carbon-carbon olefinic bonds, the 1,4-double bond content was reduced to less than 30%. *See* Application, page 3, lines 8-12. Additionally, when reducing the vinyl content to from 45% to 2%, more than 60% of the 1,4 double bonds were also hydrogenated. *See* Application, page 3, lines 8-12. *See* Application, page 3, lines 12-14. Also, for polymers having an even higher vinyl content than 45%, an even greater percentage of 1,4-double bonds would be hydrogenated because longer hydrogenation times are required. *See* Application, page 3, lines 14-17. From these results, it can be seen that the selectivity of the instant claims is not shown by the example of **Winkler**.

The Examiner contends that the Applicants' comparative examples have not accurately reproduced the example of the reference, and therefore the reason for Applicants' failure to obtain the predicted product cannot be determined. Applicants respectfully disagree. Applicants respectfully assert that comparative example 1 of the present application is sufficient to demonstrate the results of example 1 according to **Winkler**.

As can be seen in comparative example 1 of the present application, the starting vinyl content is 45%, which is similar to the starting vinyl content of 46% in example 1 of the **Winkler** reference. *See* application, table 1; **Winkler**, col. 6, line 19. Furthermore, the same solvent, cyclohexane was used in both example 1 of the present application and example 1 of the **Winkler** reference. *See* application, page 13, line 15; **Winkler**, col. 6, line 3. Additionally, Applicants would also like to point out that similar hydrogenation temperatures were used. In example 1 of the present application, the temperature of the reactor was kept constant at 40°C, while in example 1 of **Winkler**, the temperature "rose to 50°C." *See* Application, page 14, line 26-28, **Winkler**, col. 6, line 27. Applicants respectfully note the similarity of the temperature of the two systems. Therefore, due to the aforementioned factors and components, Applicants respectfully assert that comparative example 1 of the present application is representative of example 1 of **Winkler**.

Furthermore, with view to the disclosure of **Winkler**, the instant application demonstrates unexpected results. **Winkler** discloses the use of Fe-containing catalysts in addition to Co and Ni. *See Winkler*, col. 5, lines 14-15. However the reference does not give any indication or suggestion that the corresponding Fe catalysts would produce better results. *See Application*, page 3, lines 21-26. However, as shown in table 1 of the present application, example 3 demonstrates selectivity in hydrogenation wherein the 1,4 vinyl content is greater than 30%, and vinyl content below 5% after 10 minutes of hydrogenation when a Fe-containing catalyst is used.

The Examiner further argues that regarding the presence of lithium alkoxide, the example in the cited reference does not include any components which would result in lithium alkoxide. However, Applicants respectfully submit that it is of little relevance in this instance that example 1 does not disclose a lithium alkoxide causing component was used, because in fact the example does not discuss or disclose any component for terminating the polymerization. Despite this, in column 4, lines 18-20 of the reference it is indicated that “lithium ions may be removed or neutralized by the addition of polar materials such as an alcohol, water, or oxygen.” (emphasis added) Therefore as the reference contemplates the use of alcohol, and in view of the wide practice at the time of use of methanol, applicants respectfully assert that the alcohols are well within the method disclosed by **Winkler**. Furthermore such alcohols would result in lithium alkoxide. However, Applicants respectfully assert that **Winkler** does not disclose or suggest that alcohol could have a negative impact on hydrogenation selectivity, or that any components should be preferred for termination of the polymerization. Applicants respectfully submit that this further contributes to the unexpectedness of the experimental results of the present application.

In view of the foregoing, Applicants respectfully assert that the **Winkler** reference does not disclose the selectivity according to the instant claims, and furthermore the examples of the present application demonstrate superior results. Accordingly, Applicants respectfully request that the 35 USC §103 rejection be withdrawn.

REJECTION UNDER 35 USC §103 OVER WINKLER IN VIEW OF WILLIS

Claims 17-22 and 27-32 stand rejected under 35 USC §103 as being rejected over **Winkler** in view of **Willis**, 4,396,761. Applicants respectfully traverse this rejection.

Applicants respectfully re-assert the remarks made above regarding **Winkler**, and further assert that even in view of **Willis**, no prima facie case of obviousness can be established. However, Applicants provide further remarks as follows.

Applicants respectfully note that instant claim 17 recites that the hydrogenation catalyst residue is extracted from the solution of hydrogenated polymer in the absence of an oxidation agent.

The Examiner states that **Winkler** is primarily concerned with the hydrogenation process, and does not discuss methods of polymer processing workup, such as catalyst removal steps. The Examiner contends that removal of the transition metal catalyst is commonly done to improve the properties of the hydrogenated polymer. The Examiner therefore concludes that it would have been obvious to one of ordinary skill in the art to use a method for removing hydrogenation residues by treatment with an alpha hydroxyl sulfonic acid according to the process disclosed in **Willis**. Applicants respectfully disagree.

Applicants respectfully note that oxidation agents can include oxygen, and therefore extractions taking place in the presence of air, which contains oxygen, in fact have an oxidation agent present. Accordingly, affirmative steps are often required to purge the reaction system of air, or remove any oxidation agents. One method is shown in example 9 of the present application wherein it is recited that the glass vessel wherein the extractions were performed was “thoroughly purged with nitrogen.” *See* Application, page 18, lines 3-4.

Applicants respectfully assert that the process as disclosed in **Willis** occurs in the presence of an oxidation agent. As indicated in col. 6, lines 54-55, the hydrogenated polymer was added to a 1L glass reactor. *See also*, **Willis**, Col. 7, lines 14-15. After this, the alpha-hydroxymethanesulfonic acid was added to the reactor. Applicants respectfully note that there is NO indication that steps were taken to purge the reactor system of air nor any steps taken to remove dissolved air from the aqueous acid solution. As air is an

oxidizing agent, Applicants respectfully assert that the extraction process disclosed in Willis occurs in the presence of an oxidation agent. Therefore, no prima facie case of obviousness can be established.

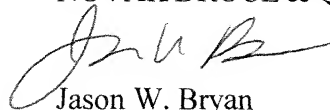
In view of the foregoing, Applicants respectfully request that the above 35 USC §103 rejection be withdrawn.

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### **Conclusion**

Having addressed all issues set out in the Office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,  
NOVAK DRUCE & QUIGG, LLP



Jason W. Bryan  
Reg. No. 51,505

1000 Louisiana Ave  
53<sup>rd</sup> floor  
Houston, Texas 77002  
T: 713-571-3400  
F: 713-456-2836